Silicon Mountain Design

28 December 1994

Office of Naval Research
Attn: William Miceli, ONR 313, Program Officer
Ballston Tower One
800 North Quincy Street
Arlington, VA 22217-5660

Reference: Contract N00014-94-C-0241
"An Ultra-High Speed Incoherent-to-Coherent Converter for Optical Computing"

In accordance with contract data requirements, enclosed is the monthly status report for the period 1 December - 30 December 1994.

If you have any comments or questions you may contact me at (719) 576-4800.

Sincerely,

David W. Gardner
Program Manager

Encl.

Copy to: DCMAO Denver
Director, Naval Research Laboratory, Code 2627
Defense Technical Information Center (2)
Ballistic Missile Defense Organization - T/IS

Letter only to: DCMO COS

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Office of Naval Research
Arlington, VA
Contract N00014-94-C-0241

Monthly Status Report
December 1 - December 31, 1994

DESCRIPTION

Many optical computing problems are centered around the processing of incoherent images. These images may be conventional visible light such as those taken with a CCD imager or camcorder. They may also take the form of infrared images in the case of missile seekers or x-ray images from medical or other sources. For optical processing, these images must be converted to either phase or amplitude modulated coherent light. This is typically accomplished by electronically feeding the originally captured image into a spatial light modulator (e.g., liquid crystal or deformable mirror array) and modulating a coherent reference beam with the 2 dimensional data pattern. The electrical input to the SLM creates a data flow bottleneck in the optical processing system due to the inherently serial input architecture. SMD has proposed a novel incoherent to coherent image converter which solves this problem by providing a massively parallel, optical input feed capability. The proposed architecture utilizes a novel combination of micromachining and ultra-thinned wafer technology to achieve an integrated incoherent to coherent image converter. The converter is capable of directly converting UV, IR, visible, and x-ray energy to a coherent light representation allowing for maximum utilization of downstream optical processing.

DECEMBER ACTIVITIES

During December, ultra-thin wafers were received. These wafers are n-type starting material and are 10 microns thick. The device process flow has been refined through multiple simulations with SUPREME and PISCES modeling routines. The design and layout of a 16 x 16 array of SLM pixels has been completed and is currently being reviewed for electrical and mechanical acceptability. Photolithographic mask generation will begin in the next week.

TO GO ACTIVITIES

During January, a program technical review meeting will be scheduled to brief BMDO on program developments. It is anticipated that mask designs will be released for fabrication in the first week of January and that actual SLM fabrication will begin by mid January 1995. Test fixturing for evaluation of the final devices will also be implemented during January.

PROBLEMS/CONCERNS

None

SCHEDULE/BUDGET

The program is currently on schedule except for the program kickoff meeting. The program is within budget.

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